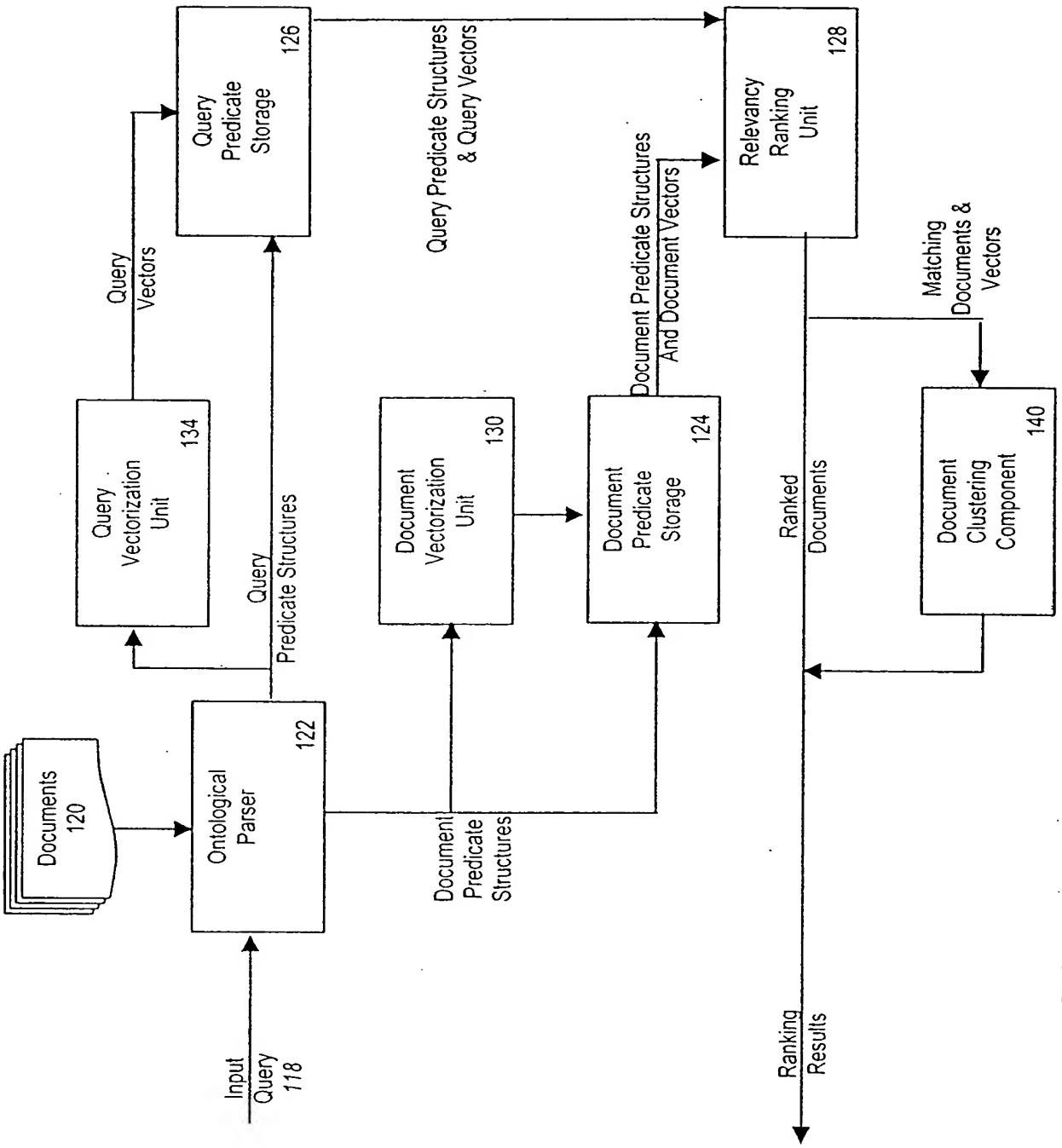
Documents
120
Ontological
Parser
122
Input
Query
118
Query
Vectorization
Unit
134
Query
Predicate
Storage
126
Query
Vectors
Query
Predicate Structures
Document
Vectorization
Unit
130
Document
Predicate
Structures
Document
Predicate
Storage
124
Query Predicate Structures
& Query Vectors
Document Predicate Structures
And Document Vectors
Relevancy
Ranking
Unit
128
Matching
Documents &
Vectors
Ranked
Documents
Document
Clustering
Component
140
Ranking
Results

Figure 1

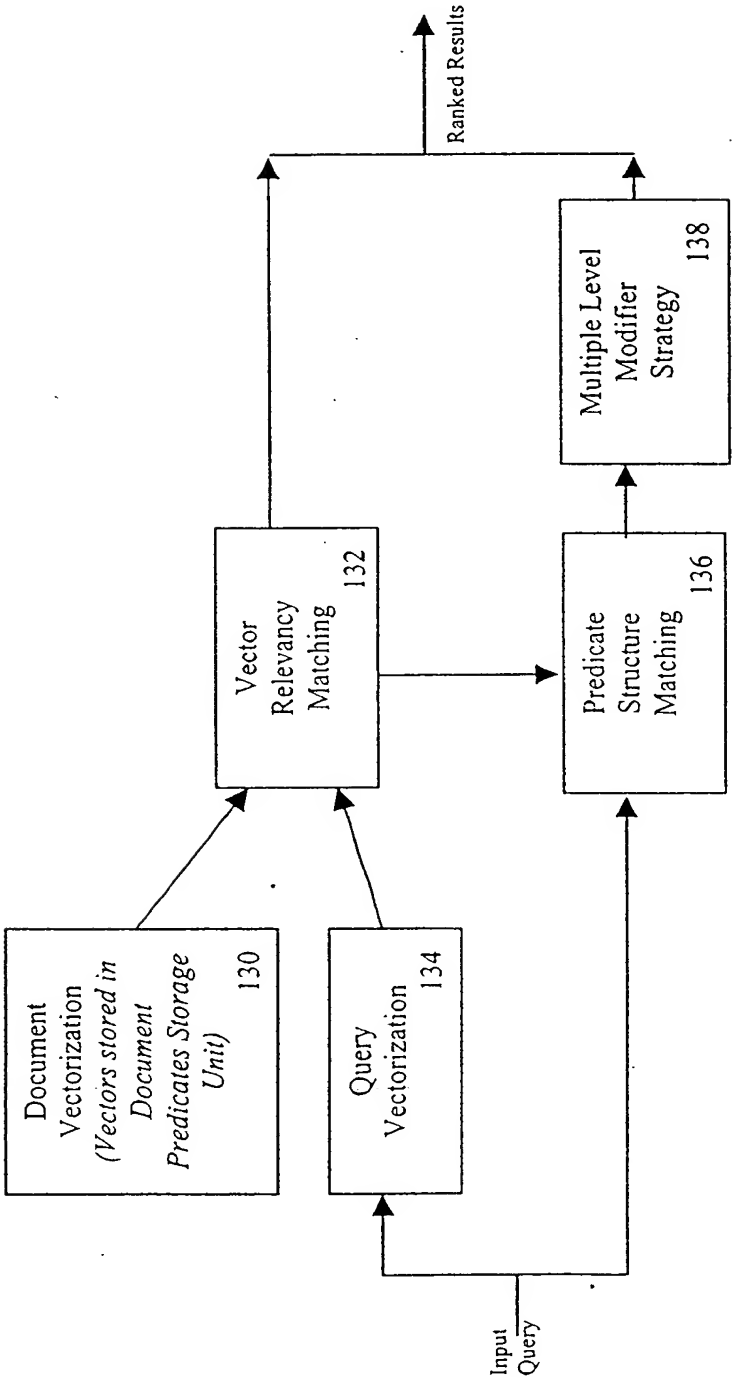
Ranked Results
Multiple Level Modifier Strategy 138
Vector Relevancy Matching 132
Predicate Structure Matching 136
Document Vectorization (Vectors stored in Document Predicates Storage Unit) 130
Query Vectorization 134
Input Query

Figure 2

Table 1 Examples of Modifier Names and Weights

Modifier Name	Explanation of Modifier	Weight
VerbOnlyMatchModifier	Parameter for two matching predicates in two predicate structures.	4
NounModifier	Parameter for matching noun arguments in two predicate structures	6
VerbNounMatchModifier	Parameter for matching complete predicate structures.	8
PredicateStructureExactMatchModifier	Parameter for two exactly matched predicate structures	40
PredicateExactMatchModifier	Parameter for two exactly matched predicates	25
ConceptExactMatchModifier	Parameter for two exactly matched concepts	15
ConceptProximityModifier	Parameter considering the ontological relationship between two concepts	$ConceptExactMatchModfier \times (1 - \frac{highest_order_difference_digit}{identifier_digit_number})$
SameStemModifier	Parameter for two words from same stem	20
ArgumentMatchModifier	Parameter for two arguments that exactly match	10
ProperNounExactMatchModifier	Parameter for two exactly matched proper nouns	15
SymbolMatchModifier	Parameter for two matched symbols	10
FrontLineModifier	Parameter for a predicate in which the corresponding sentence occurs in the first 10 sentences of the document	5
DocSizeModifier	Parameter to adjust for overall document size	0.035

Figure 3

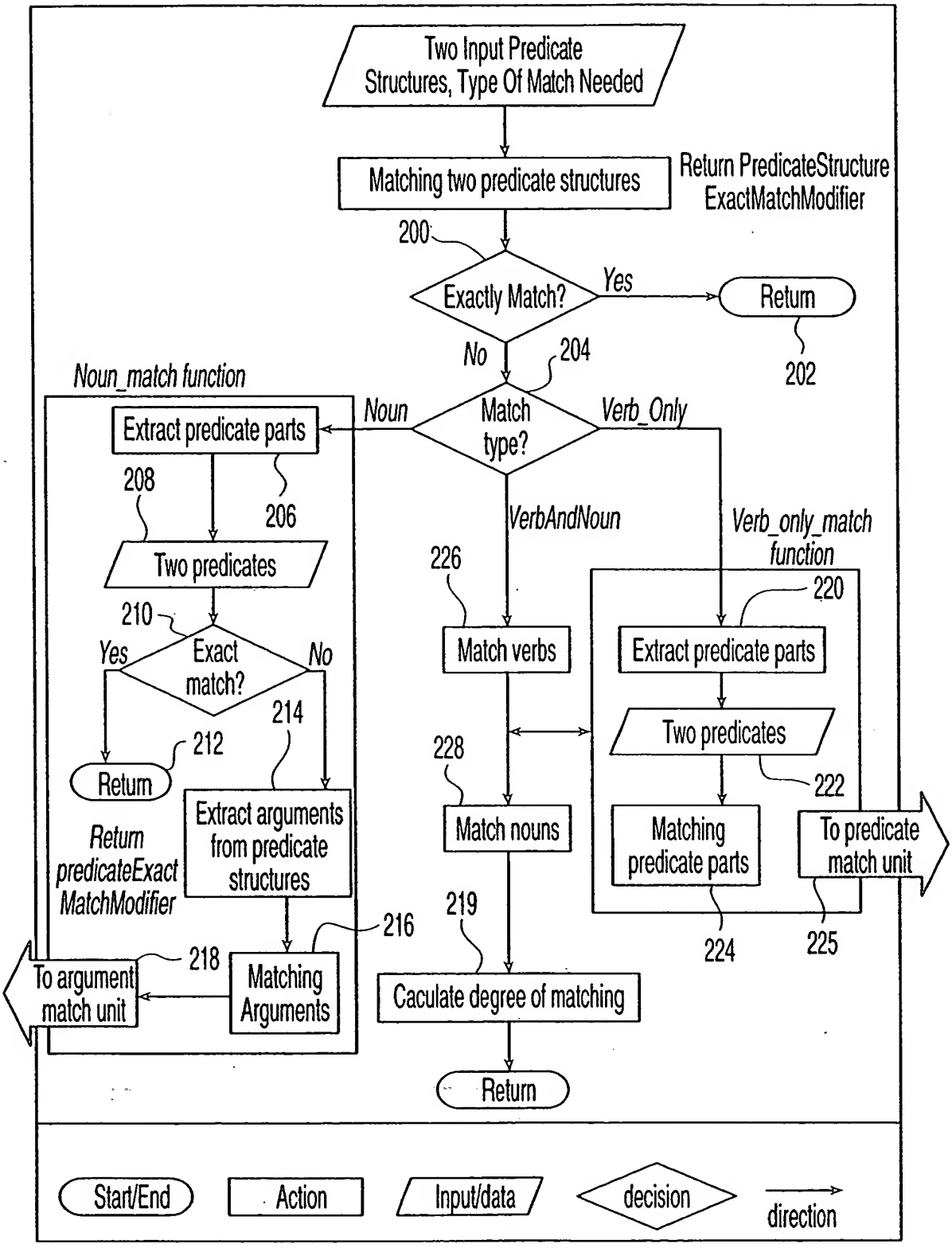
Two Input Predicate Structures, Type Of Match Needed
Matching two predicate structures
Return PredicateStructure ExactMatchModifier
200
Exactly Match?
Yes
Return
202
No
204
Noun_match function
Noun
Match type?
Verb_Only
Extract predicate parts
208
206
Two predicates
210
Yes
Exact match?
No
214
212
Return
Extract arguments from predicate structures
Return predicateExact MatchModifier
216
218
To argument match unit
Matching Arguments
VerbAndNoun
226
Match verbs
228
Match nouns
219
Caculate degree of matching
Return
Verb_only_match function
220
Extract predicate parts
Two predicates
222
Matching predicate parts
To predicate match unit
224
225
Start/End
Action
Input/data
decision
direction

Figure 4

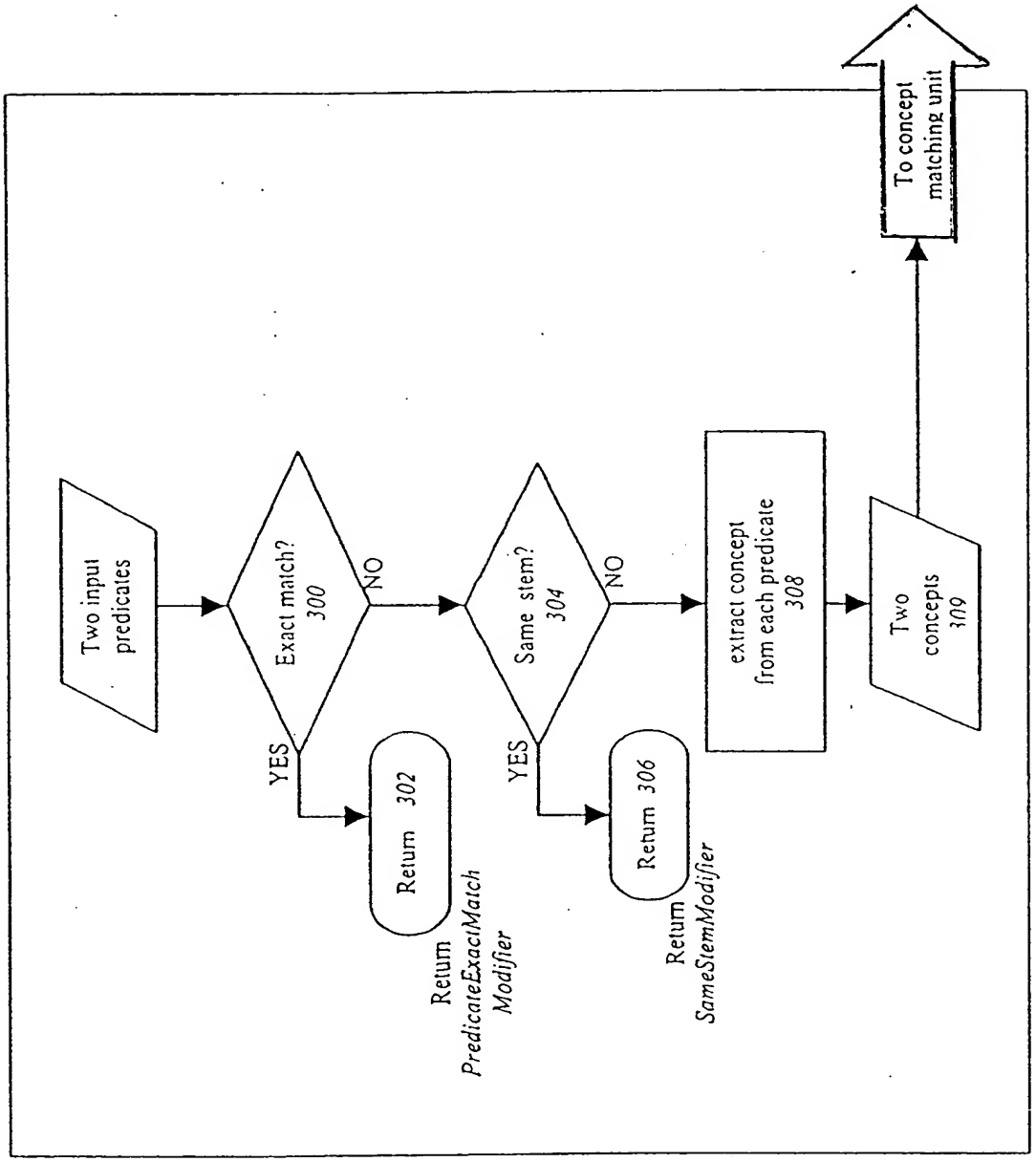
Two input predicates
Exact match? 300
YES
NO
Return 302
Return PredicateExactMatch Modifier
Same stem? 304
YES
NO
Return 306
Return SameStemModifier
extract concept from each predicate 308
Two concepts 309
To concept matching unit

Figure 5

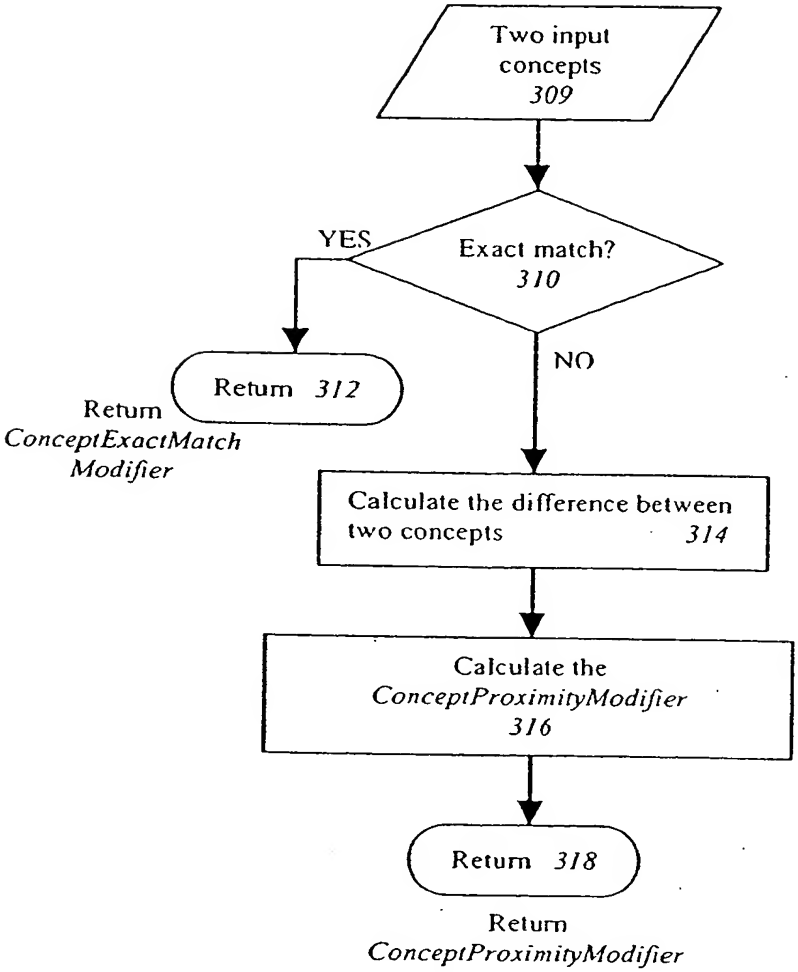
Two input concepts 309
Exact match? 310
YES
NO
Return 312
Return ConceptExactMatch Modifier
Calculate the difference between two concepts 314
Calculate the ConceptProximityModifier 316
Return 318
Return ConceptProximityModifier

Figure 6

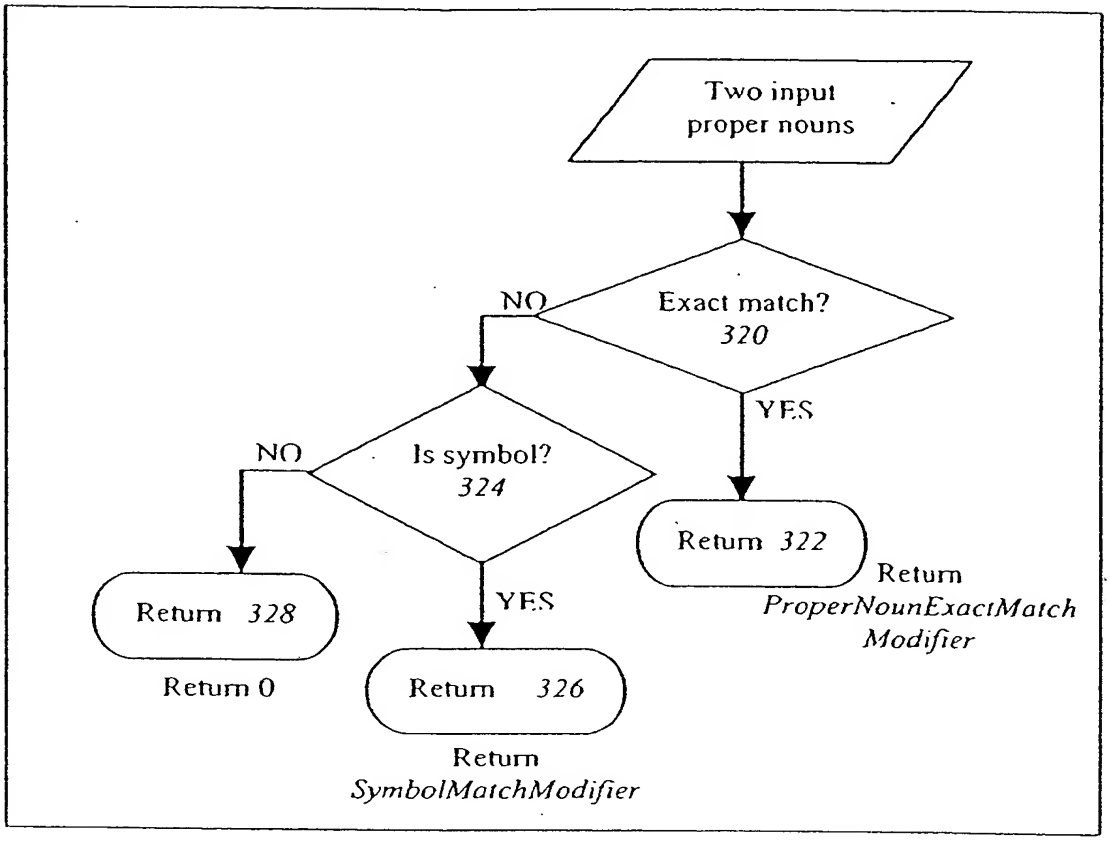
Two input proper nouns
Exact match? 320
NO
YES
Is symbol? 324
NO
YES
Return 322
Return ProperNounExactMatch Modifier
Return 328
Return 0
Return 326
Return SymbolMatchModifier

Figure 7

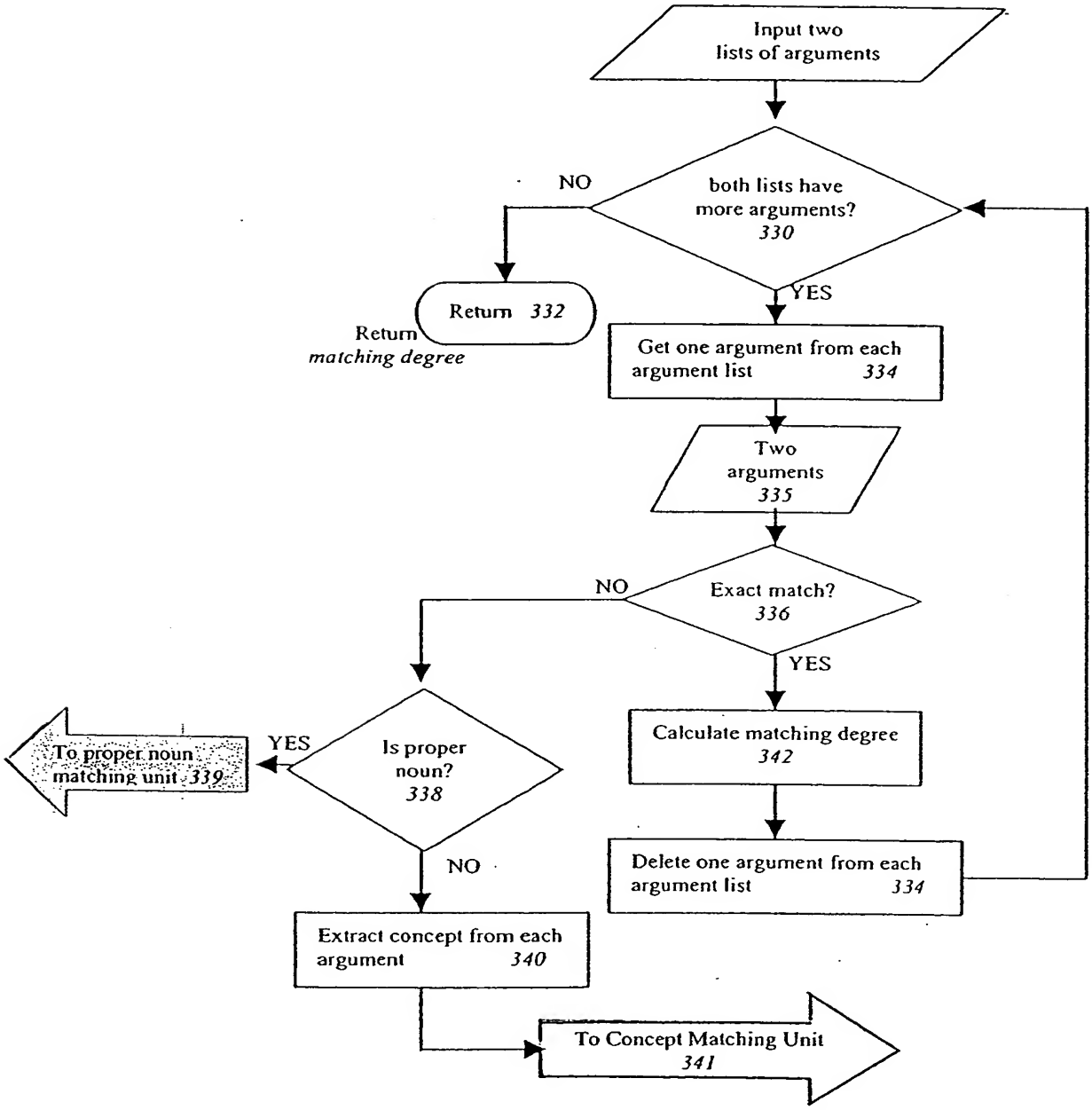
Input two lists of arguments
both lists have more arguments? 330
NO
YES
Return 332
Return matching degree
Get one argument from each argument list 334
Two arguments 335
Exact match? 336
NO
YES
Is proper noun? 338
YES
To proper noun matching unit 339
NO
Calculate matching degree 342
Delete one argument from each argument list 334
Extract concept from each argument 340
To Concept Matching Unit 341

Figure 8

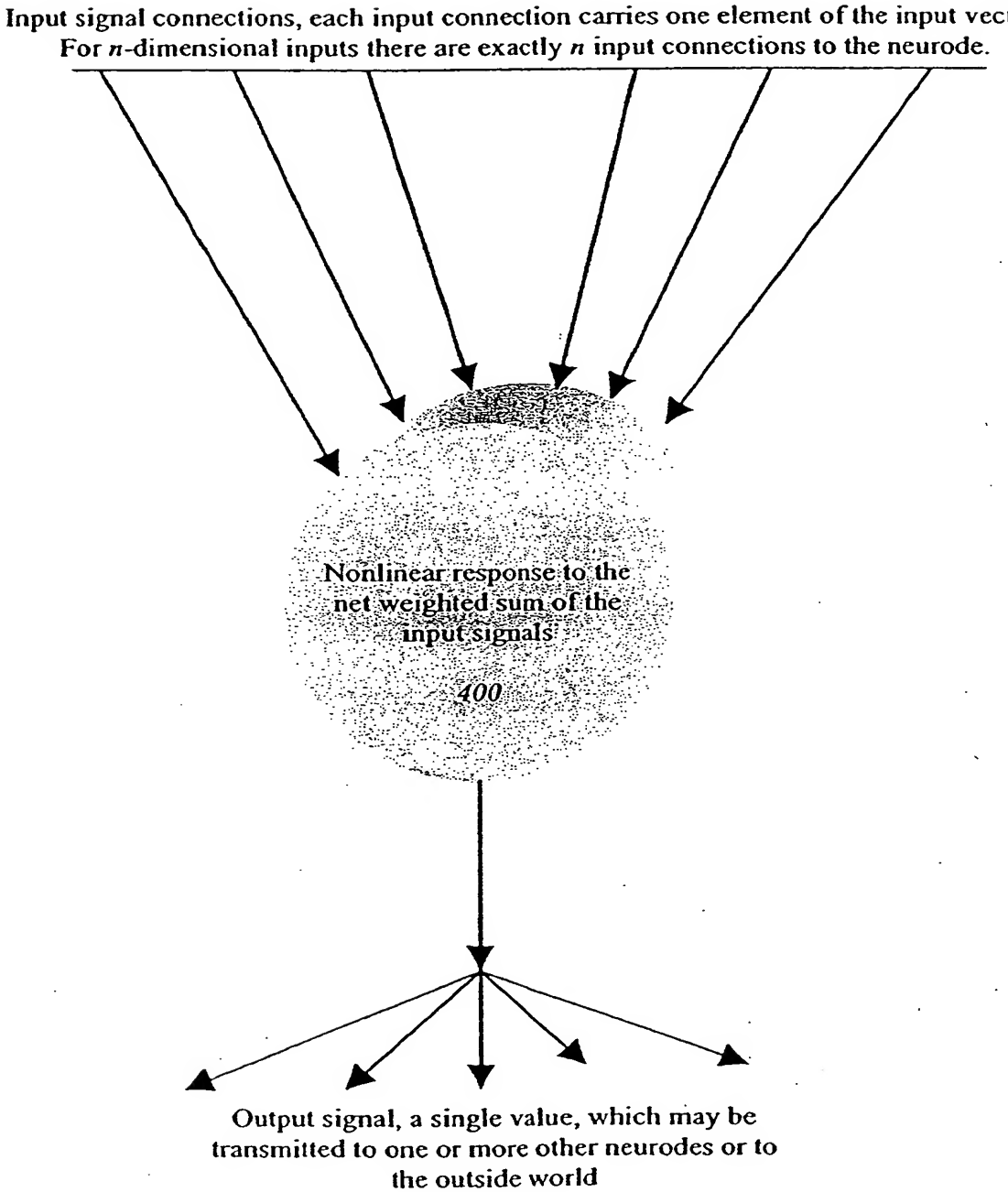
Input signal connections, each input connection carries one element of the input vector. For n-dimensional inputs there are exactly n input connections to the neurode.
Nonlinear response to the net weighted sum of the input signals
400
Output signal, a single value, which may be transmitted to one or more other neurodes or to the outside world

Figure 9

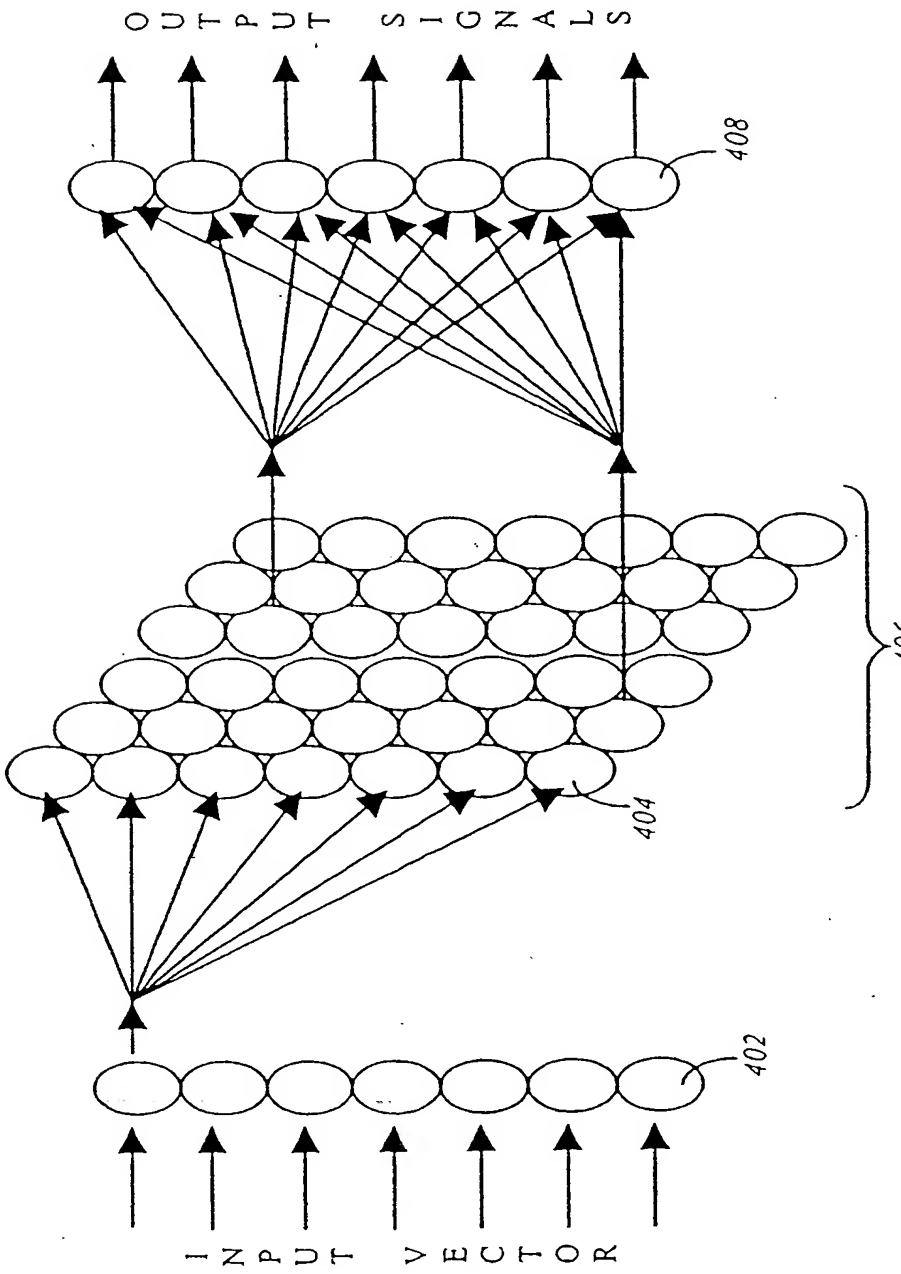
OUTPUT SIGNALS
408
Output Layer
406
Middle (Processing) Layer
404
402
Input Layer
INPUT VECTOR

Figure 10

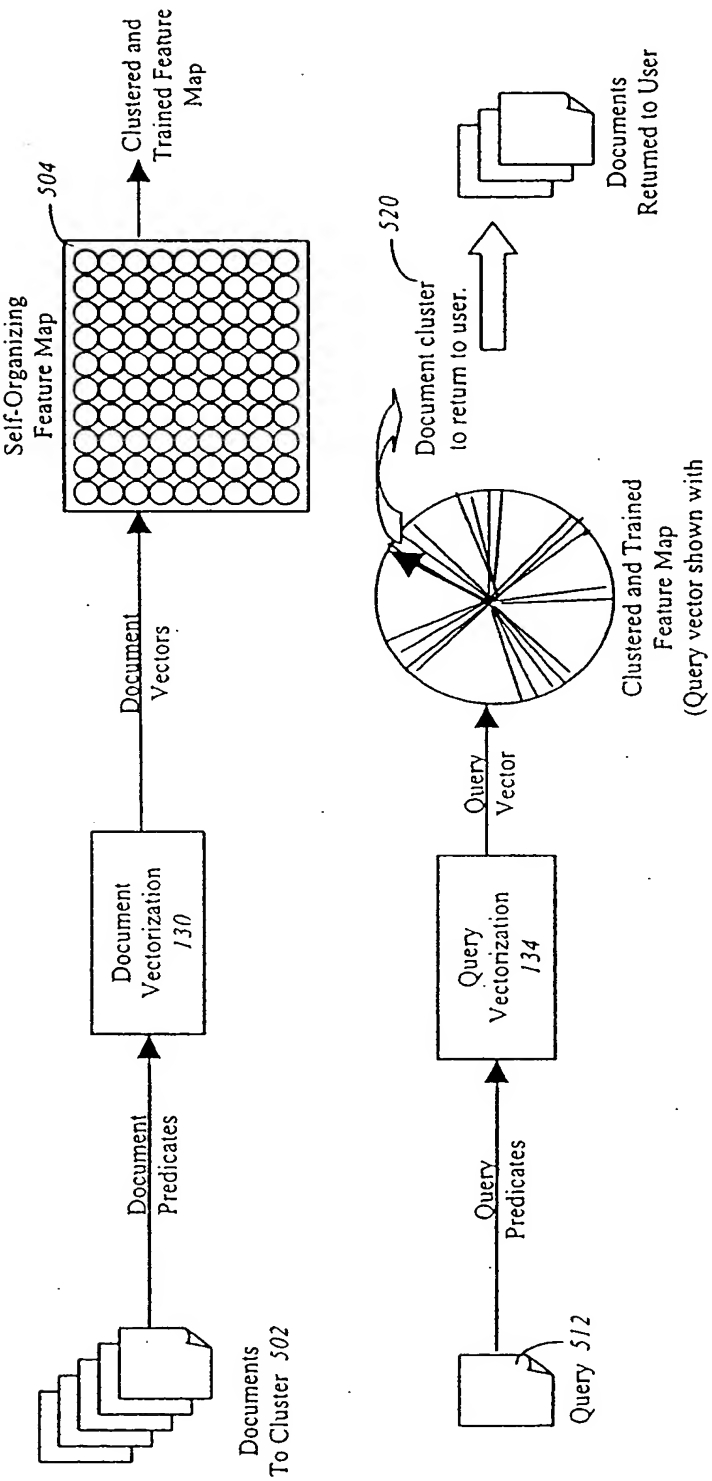
Documents To Cluster 502
Document Predicates
Document Vectorization 130
Document Vectors
Self-Organizing Feature Map
504
Clustered and Trained Feature Map
Query 512
Query Predicates
Query Vectorization 134
Query Vector
Clustered and Trained Feature Map (Query vector shown with arrowhead.)
520
Document cluster to return to user.
Documents Returned to User

Figure 11

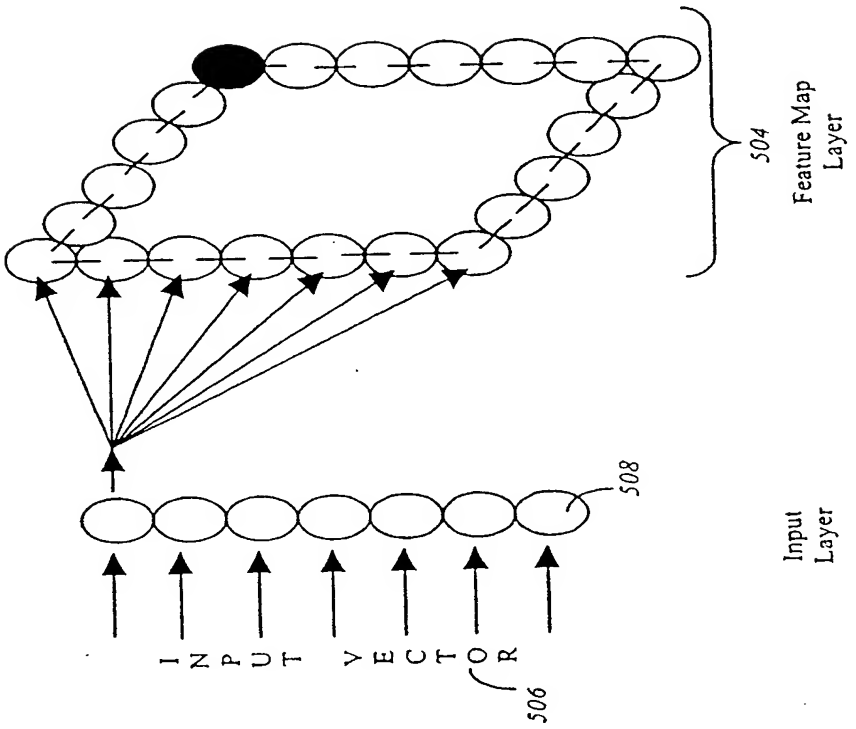

Figure 12

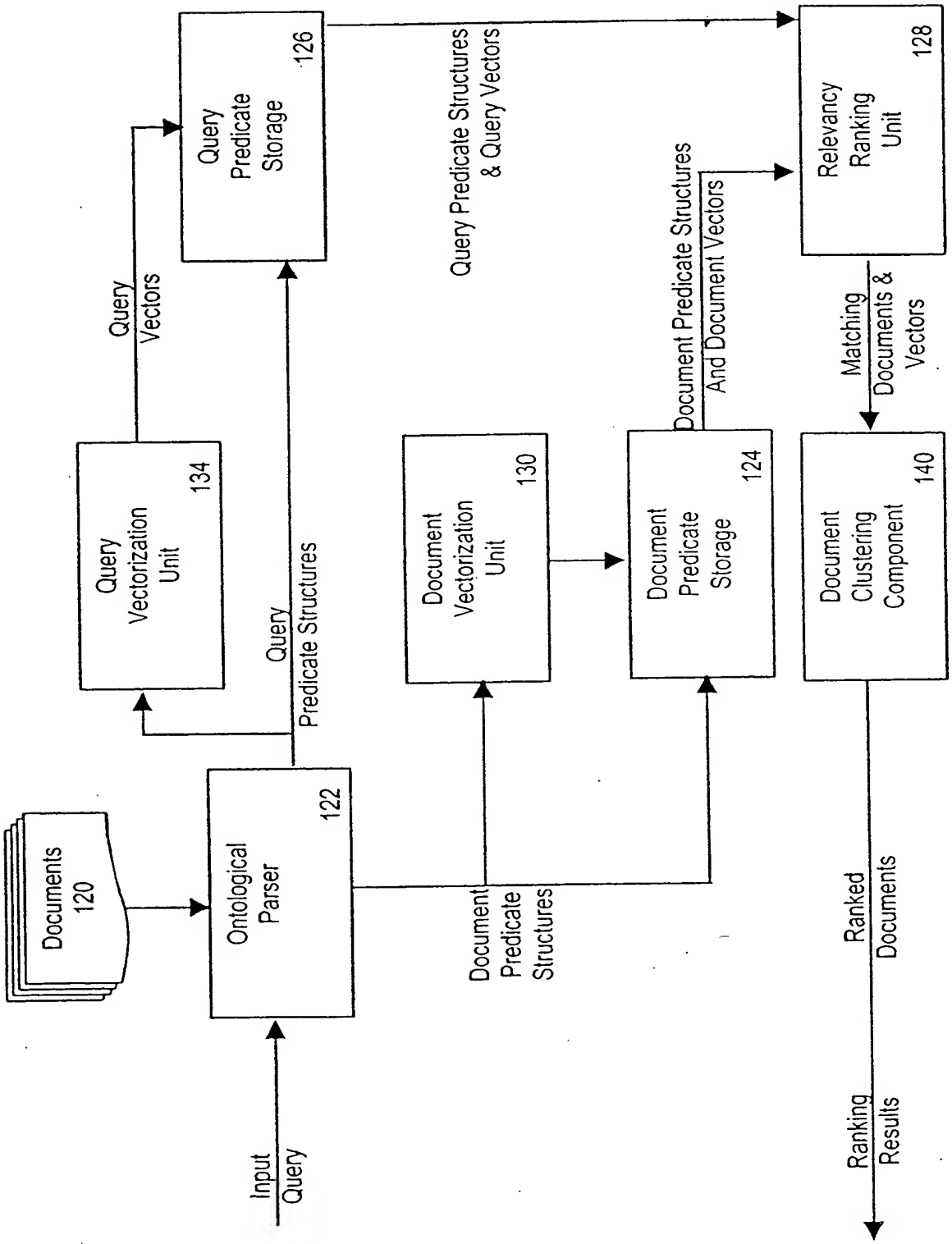
Documents
120
Ontological
Parser
122
Input
Query
Query
Vectorization
Unit
134
Query
Vectors
Query
Predicate
Storage
126
Query
Predicate Structures
Document
Vectorization
Unit
130
Document
Predicate
Structures
Query Predicate Structures
& Query Vectors
Document Predicate Structures
And Document Vectors
Document
Predicate
Storage
124
Relevancy
Ranking
Unit
128
Matching
Documents &
Vectors
Document
Clustering
Component
140
Ranked
Documents
Ranking
Results

Figure 13

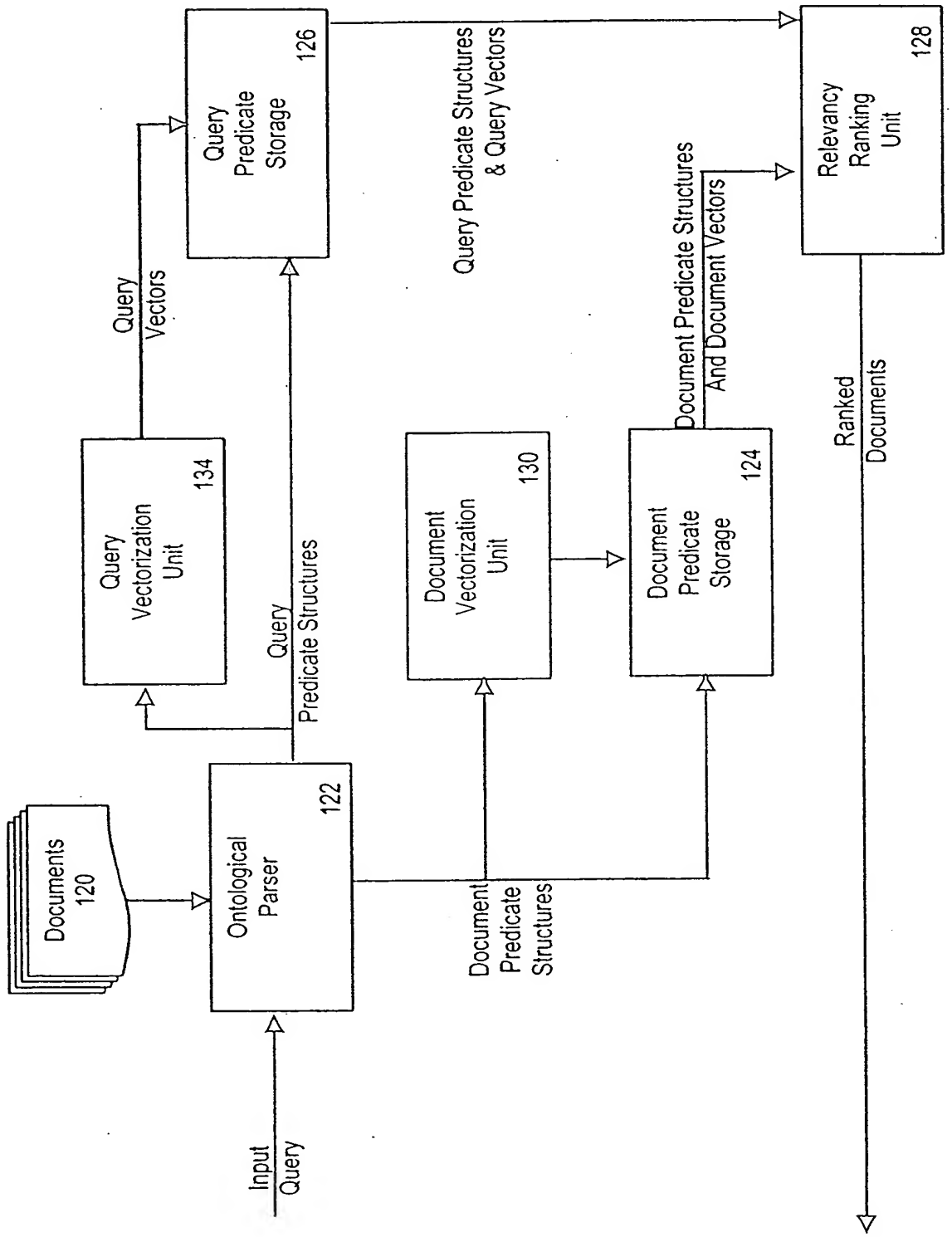
Documents
120
Ontological
Parser
122
Input
Query
Query
Vectorization
Unit
134
Query
Predicate
Storage
126
Query
Vectors
Query
Predicate Structures
Document
Vectorization
Unit
130
Document
Predicate
Storage
124
Document
Predicate
Structures
Query Predicate Structures
& Query Vectors
Document Predicate Structures
And Document Vectors
Relevancy
Ranking
Unit
128
Ranked
Documents

Figure 14

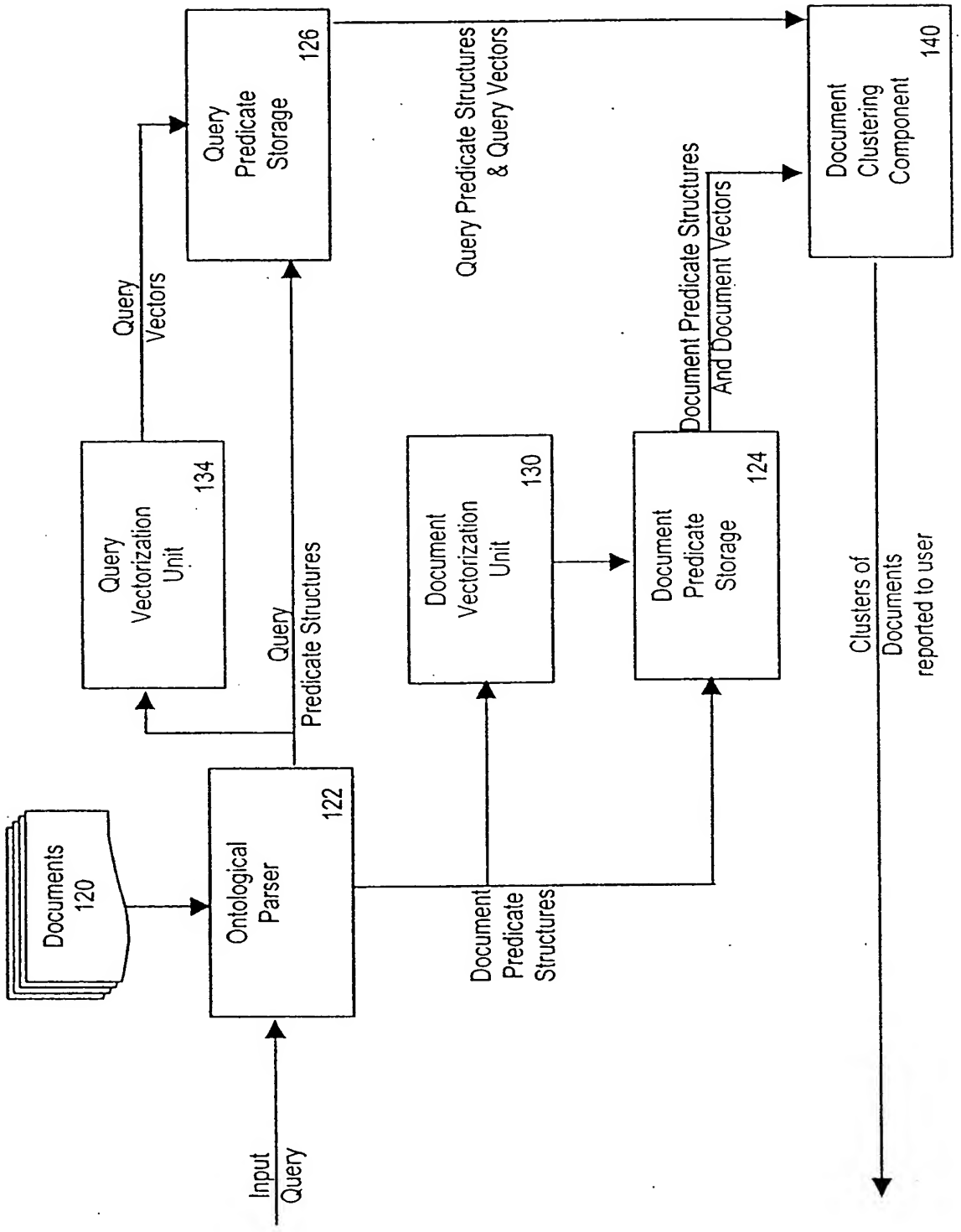
Input Query
Documents 120
Ontological Parser 122
Query Vectorization Unit 134
Query Predicate Storage 126
Query Vectors
Query Predicate Structures
Document Vectorization Unit 130
Document Predicate Structures
Document Predicate Storage 124
Document Predicate Structures And Document Vectors
Query Predicate Structures & Query Vectors
Document Clustering Component 140
Clusters of Documents reported to user

Figure 15

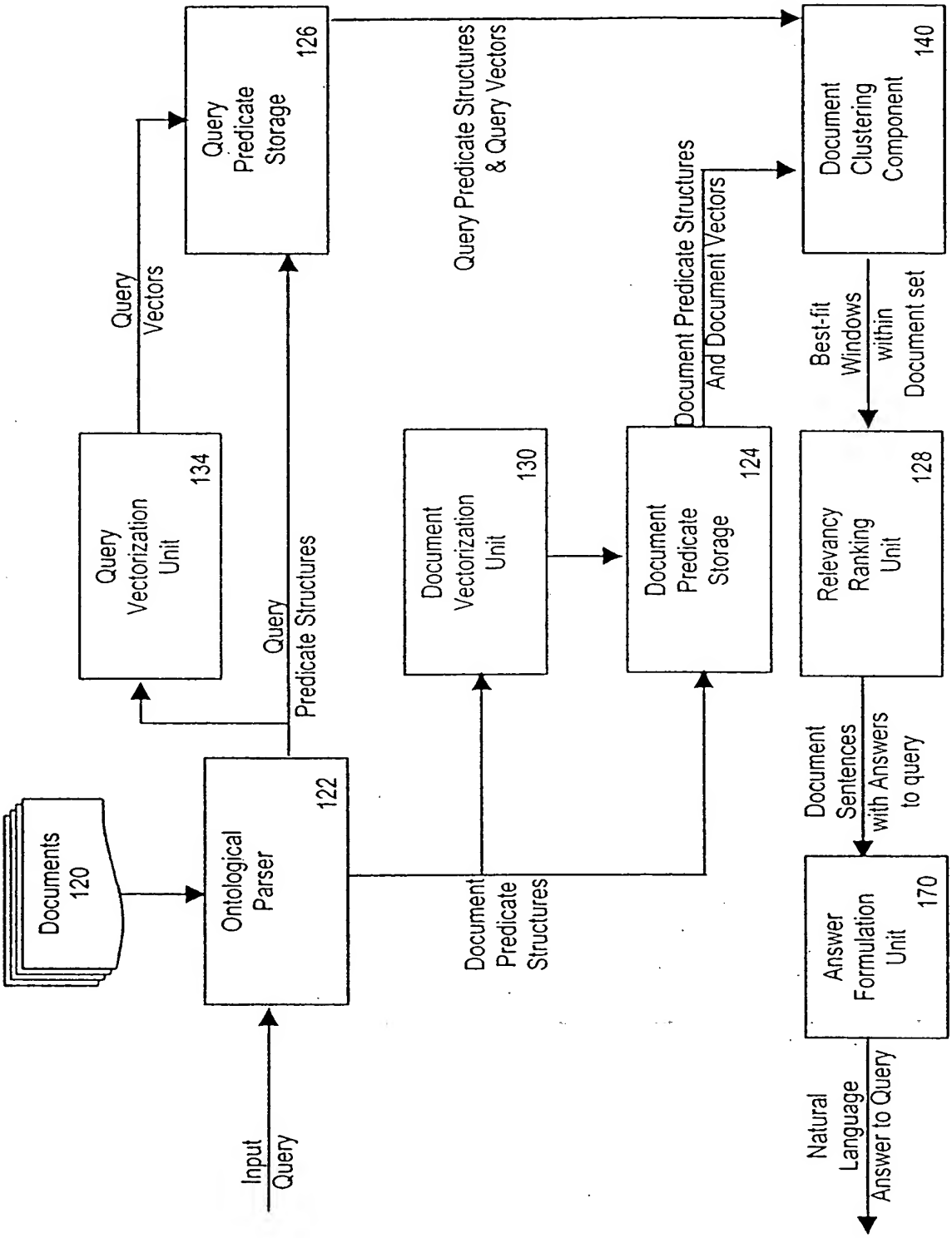
Documents
120
Ontological
Parser
122
Input
Query
Query
Vectorization
Unit
134
Query
Predicate
Storage
126
Query
Vectors
Query
Predicate Structures
Document
Vectorization
Unit
130
Document
Predicate
Storage
124
Document
Predicate
Structures
Query Predicate Structures
& Query Vectors
Document Predicate Structures
And Document Vectors
Document
Clustering
Component
140
Best-fit
Windows
within
Document set
Relevancy
Ranking
Unit
128
Document
Sentences
with Answers
to query
Answer
Formulation
Unit
170
Natural
Language
Answer to Query

Figure 16